

## THROMBOSIS OF THE MESENTERIC VEINS AS A CAUSE OF DEATH AFTER SPLENECTOMY.<sup>1</sup>

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I DO not intend in this paper to review the literature of the surgery of the spleen, but desire to call attention to one of the rare and unavoidable complications which may happen in the after-course of a case of splenectomy.

In connection with the case about to be reported, a reference to the circulation in the spleen is essential.

The spleen, situated in the left hypochondriac region, receives its blood-supply through the splenic artery, the largest branch of the cœliac axis. The return circulation is through the splenic vein, which commences by five or six branches emerging separately from the hilus of the spleen, and passes from left to right beneath the pancreas and joins with the superior mesenteric vein, at nearly a right angle, to form the hepatic vein.

The splenic usually receives the inferior mesenteric vein before the junction, but the inferior mesenteric may join the splenic just at the angle of junction with the superior mesenteric or may empty directly into the superior mesenteric vein.

The latter was the method of union in the following case :

J. C., aged thirty-one; married; Norwegian. When she was but four years old a swelling in her left side was noticed. This gradually increased in size, but was unaccompanied by pain or other symptoms. Patient had been married nine years and never pregnant until 1892. No specific or rheumatic history acknowledged.

In June, 1893, she had a hæmorrhage from the stomach and

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bowels. Three months later this was repeated, and January 1, 1894, it was repeated a third time, a fourth in March, and a fifth in June, the intervals gradually decreasing. During this time she became very anæmic and lost flesh and strength. Coincident with the first hæmorrhage the abdominal tumor began to enlarge gradually. Pain was not at any time a feature, but the increased size of the tumor gave her considerable discomfort.

On admission to the Norwegian Hospital, July 18, 1894, she was much emaciated; temperature 100° F.; pulse 96; appetite fair; and sleep normal. Physical examination of heart and lungs was negative.

Inspection of the abdomen revealed a distinct projection in the left side extending from the free border of the ribs to the crest of the ilium. By palpation a tumor, firm in consistence, not tender, and quite movable, was found to occupy the site of the swelling.

Treatment was at once directed to the anæmia, and iron, combined with quinine and strychnine, was administered, together with inhalations of compound oxygen four times a day.

Examination of the blood by Dr. de Forest. Red corpuscles, 3,568,000; white corpuscles, 7000; hæmoglobin, 45 per cent.

The patient improved somewhat under this treatment and gained in strength and color.

On August 17 another examination of the blood was made, with the following results: Red blood-corpuscles, 3,464,000; white blood-corpuscles, 4000; hæmoglobin, 50 per cent.

The diagnosis of simple hypertrophied spleen having been made, and leukæmia excluded, and the patient fearing a repetition of the hæmorrhages, an operation for extirpation of the organ was determined upon.

On August 22, 1894, with the assistance of Drs. Wood and Cameron and the members of the house-staff, the operation was performed. An incision five inches long was made along the edge of the left rectus with the centre about opposite the umbilicus. On opening the peritoneum the spleen immediately came to view. No adhesions were found except at the upper angle; further examination, however, showed that the organ had been rotated on its long axis so that the hilus was to the outer side and the vessels passed beneath the spleen before entering it. This rotation was easily overcome and the spleen then readily brought up into the wound. A larger clamp was placed across the vessels and the spleen cut away. The stump was

then secured by ligatures in three sections, and the abdominal wound was closed by crossed sutures of silkworm-gut and a subcuticular silk suture of the skin.

The operation lasted forty minutes; practically no blood was lost, save what came from the spleen, and no shock followed.

The after-treatment, as far as the wound was concerned, was practically without incident, the subcuticular suture was removed on the tenth day, and the deep sutures on the eighteenth.

Although the wound did not give any anxiety, a series of rapidly succeeding complications developed and apparently changed the result of the case.

On the second day after operation the temperature suddenly reached  $103\frac{2}{5}^{\circ}$  F., and the physical signs of pneumonia of the left lung began to appear.

Under appropriate treatment defervescence began on the tenth day, and on the fifteenth day the temperature was normal.

On the next day, September 6, the temperature again rose to  $103\frac{2}{5}^{\circ}$  F., respiration 44, and the signs of a right-sided pneumonia appeared. With this there was also a moderate diarrhoea.

September 8. Temperature still continued high and diarrhoea did not yield to treatment.

September 10. Physical signs of fluid in the right chest present, but aspiration failed to detect fluid.

September 12. Morning temperature, normal; evening,  $100^{\circ}$  F.; pulse, 94; respiration, 24. Patient quite bright and desired to sit up. Diarrhoea still continued.

September 14. Patient cheerful and free from distress of all kinds. Suddenly, about 11.30 in the morning, vomiting began, severe pain developed in the abdomen, temperature rose to  $104^{\circ}$  F., and patient collapsed, the pulse being imperceptible. During the afternoon and evening vomiting continued, and tympanitis began to develop. She continued to fail, and at 10.30 A.M., September 15, she died, just twenty-four days after operation.

*Autopsy.*—Wound of operation firmly healed.

*Thorax.*—Left lung shows a few old pleuritic adhesions and is slightly oedematous.

Right lung is bound down to chest-wall, over its entire extent, by both old and new adhesions. Over the diaphragm is a cavity, between lung and muscle, containing a small quantity of serum. The lung itself shows a partially-resolved lobar pneumonia of its lower lobe,

with some evidence of beginning areas of gangrene. The upper lobe is normal.

*Heart.*—Pale, contracted; valves normal.

*Abdomen.*—The cavity contains a pint or so of blood-stained serum, and the folds of small intestine which present at the incision are dark-purple, congested, and resemble gut which has been strangulated. There are a few omental adhesions in the left hypochondriac region, but no other adhesions. The peritoneal surface beneath the skin wound is smooth and the line of operative wound can be made out with difficulty. This congested portion of intestine is about the entire middle third of the small intestine. The line of demarcation between normal and congested gut is not sharply defined, and extends with varying intensity around the gut.

The spleen is absent. At the stump, from which it was removed, the silk sutures are still in place, and there is no evidence of the slightest sepsis at this point. The splenic veins are greatly distended, tortuous, and filled for the entire extent with a firm thrombus, which extends into the portal vein and occludes the mouths of the mesenteric veins.

*Examination of the Spleen.*—Weight, 2240 grammes (nearly five pounds) after being drained of its blood (normal weight, seven ounces). Microscopic examination shows chronic hypertrophy with hyperplasia of the connective tissue.

The points of interest to be noted in this case are the following:

(1) The early appearance and the slow growth of the tumor for twenty-six years.

(2) The sudden increase of size attended with profuse and alarming hæmorrhages from the stomach and bowels. The rotation of the spleen on its vertical axis may have taken place at this time, and the circulatory disturbances produced by this would account for the increase of the size of the spleen. In the same way the hæmorrhages from the stomach and bowels may have resulted from venous stasis.

(3) The blood changes showed only simple anæmia. Care was taken to prove that the hypertrophy of the spleen was not an accessory lesion of leukæmia, for, in this condition, it has been shown that the operation of splenectomy is nearly, if not always, attended with a fatal termination.

(4) The slight development of shock after operation is in contrast with many reported cases. Hæmorrhage gave no anxiety during the operation; this is one of the causes of a fatal issue in many of the reported cases.

(5) Notwithstanding the severity of the operation, and the generally reduced condition of the patient, she recovered completely from a left pneumonia and a right was well advanced in resolution.

(6) The sudden collapse and death, and the apparent cause of these, are points to be especially noted. The cause of the sudden collapse seems to be without doubt the shutting off of the return circulation from a large portion of the intestine. The symptoms were almost precisely those of acute intestinal obstruction from band, where a large portion of the gut is strangulated. Collapse was almost the first symptom, a rapid rise of temperature to  $104^{\circ}$  F. from  $99^{\circ}$  F. being simultaneous with the development of collapse. The diarrhœa, which persisted for several days, was probably due to a moderate congestion of a portion of the gut.

Why the clot should extend along the splenic vein so far that it could obstruct the superior mesenteric, and why this did not develop before the end of three weeks, are matters for very serious consideration. Was there a phlebitis set up by the ligation of the veins *en masse*, and would this have been avoided by separately tying the ligatures? This may have had some effect, but it hardly seems probable, as it did not appear until so late a date.

The most probable cause seems to me to be that the persistent temperature attendant on the double pneumonia, in a patient whose blood was already altered in quality, so changed the blood that coagulation was easily induced. We must remember in this connection that the clot, at the inner extremity of the splenic just at the junction with the mesenteric vein, was recent as compared with that found nearer the ligatures.

This condition, by whatever induced, seems to be unavoidable, and a complication always to be borne in mind in giving a prognosis in a case of proposed splenectomy.